

# PATENT SPECIFICATION

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## (54) IMPROVEMENTS IN TUBE COUPLINGS

(71) We, THE WEATHERHEAD COMPANY, a corporation organised and existing under the laws of the State of Ohio, United States of America, of 300 East 131 Street, Cleveland, Ohio 44108, United States of America, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to tube couplings of the kind which comprise a first tubular screw threaded coupling member, a second tubular screw threaded coupling member arranged to be screwed to the first member, and sealing means which when tightened by tightening of the screw threaded connection between the second coupling member and the first coupling member forms the sole means which prevents fluid leakage between a tube and at least one of the coupling members.

In couplings of this kind, one coupling member is usually in the form of a body and the other in the form of a nut which screws onto the body. The sealing means is in the form of a ring having a sealing portion which is deformed on tightening the nut on the body to seal against fluid leakage. Such tube couplings provide an adequate seal when the sealing portion is deformed more than a first predetermined amount and less than a second predetermined amount, or, stated another way, when the body and the nut are between first and second predetermined positions relative to one another. This is particularly critical with respect to tube couplings which are used with plastic tubing.

It is presently known to use a torque indicating spanner or wrench to determine when the body and the nut have been tightened together between such first and second positions to prevent fluid leakage. It is also presently known to use a stop

positively to prevent the body and the nut from being tightened beyond the second predetermined position to preclude over-tightening.

According to this invention a coupling of the kind described is provided with a visual indicating ring which is spaced from the sealing means and includes oppositely facing end surfaces with an outwardly exposed axially extending outer surface between them, the indicating ring being made of resiliently deformable material and having, when unstressed, an axial extent at least twice its radial thickness, the indicating ring surrounding one coupling member and having its end surfaces engaged by faces on the coupling members but being undeformed when the first coupling member is tightened to a predetermined position relative to the second coupling member at which the sealing means is sufficiently tightened to produce a seal, and the indicating ring being visibly deformable to permit further tightening of the first coupling member relative to the second coupling member beyond the predetermined position.

In a specific embodiment, the tube coupling is intended for use with plastics tubing and the indicating ring is disposed on the outside of a body of the coupling between axially opposed abutment surfaces of the body and a nut which forms the other coupling member. The abutment surfaces engage the end faces of the ring directly to indicate that the nut is tightened to the first predetermined position relative to the body. The axially opposed abutment surfaces of the body and the nut axially compress and radially outwardly deform the ring when the nut is further tightened onto the body.

In this manner, the invention provides a tube coupling in which a positive indication is given when the relative position of the nut with respect to the body member, at which the tube coupling will prevent fluid leakage,

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shown in Figure 2, the ring 57 is not deformed and the abutment surfaces 65 and 66 just touch the end surfaces 58 and 59, respectively.

5 When the tube coupling has been uncoupled and is to be recoupled, or if the tube coupling begins to leak, it is necessary to tighten the nut 22 on to the body member 10 beyond the first predetermined position shown in Figure 2. Because the ring 57 is deformable, it does not have to be removed. As seen in Figure 3, the nut 22 may be tightened on to the body 10 beyond the first predetermined position to a second predetermined position relative to the body 10. When the second predetermined position of the nut 22 with respect to the body 10 has been reached, the stop portions 43 and 44, of the ferrule 39 engage surfaces 20 and 25, respectively, to prevent over-tightening of the tube coupling and consequent leakage or breakage.

In the preferred embodiment the ring 57 is of a resilient polyethylene material, and as is essential the axial length of the ring 57 is at least twice its radial thickness. This provides an indicating ring which is readily deformable when the nut 22 is tightened from the first predetermined position, but which does not noticeably increase the torque required to so tighten the nut 22. In an alternative embodiment, the ring 57 is of polytetrafluoroethylene. This provides an indicating ring which noticeably increases the torque required to tighten the nut 22 beyond the first predetermined position while permitting the ring 57 to be deformed when such further tightening is required. This alternative embodiment is particularly suited when the tube coupling is used in an enclosed or obstructed location which may not easily be viewed, because it provides a torque indication as well as a visual indication when the first predetermined position has been reached.

#### WHAT WE CLAIM IS:—

1. A tube coupling comprising a first tubular screw threaded coupling member, a second tubular screw threaded coupling member arranged to be screwed to the first member, sealing means which when tightened by tightening of the screw threaded connection between the second

coupling member and the first coupling member forms the sole means which prevents fluid leakage between a tube and at least one of the coupling members, and a visual indicating ring which is spaced from the sealing means and includes oppositely facing end surfaces with an outwardly exposed axially extending outer surface between them, the indicating ring being made of resiliently deformable material and having, when unstressed, an axial extent at least twice its radial thickness, the indicating ring surrounding one coupling member and having its end surfaces engaged by faces on the coupling members but being undeformed when the first coupling member is tightened to a predetermined position relative to the second coupling member at which the sealing means is sufficiently tightened to produce a seal, and the indicating ring being visibly deformable to permit further tightening of the first coupling member relative to the second coupling member beyond the predetermined position.

2. A tube coupling in accordance with Claim 1, wherein the outer surface of the indicating ring is exposed to view around the entire circumference of the tube coupling.

3. A tube coupling in accordance with Claim 1 or Claim 2, including stop means for preventing the first coupling member from being tightened beyond a second predetermined position relative to the second coupling member.

4. A tube coupling in accordance with any one of Claims 1 to 3 wherein the ring is of resilient plastics material.

5. A tube coupling in accordance with any one of the preceding claims for use with plastics tubing, wherein the sealing means includes a deformable sealing ferrule for surrounding the plastics tubing and a stiffening tube for insertion into the plastics tubing.

6. A tube coupling according to Claim 1, substantially as described with reference to the accompanying drawings.

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